CLEANUP

FUEL FARM CLEANUP

LEAD ACTIVITY
Southwest Division Naval Facilities Engineering Command (SWDIV)

STATUS
Active

MISSION
Recover free product from leaking underground storage tanks (UST)

REQUIREMENT
Navy fuel farms contain underground fuel storage tanks (USTs) and pipelines. Over the years the tanks and pipelines degrade, potentially resulting in thousands of gallons of free product leaking into the surrounding area. Technologies for product removal and for the prevention of further product leakage are required.

DESCRIPTION
During the installation of a leak detection system for the USTs and pipelines at the Naval Air Station (NAS) North Island fuel farm, free product was discovered in several groundwater monitoring wells. It was determined that the USTs and pipelines had leaked over the years, producing a 500,000-square-foot, free-phase fuel plume in the groundwater. The plume was located only 300 feet from the San Diego Bay. Metcalf & Eddy, in partnership with OHM Remediation Services (OHM), implemented a pilot study to clean up the two most affected areas of the fuel farm. The pilot study proved so successful that a full-scale recovery system was implemented to recover the remaining free product.

Through NELP, several innovative technologies were utilized during the recovery of the free product. In order to determine if pipelines were still leaking and comply with tank detection monitoring regulations, a pipeline leak detection system was put into full-scale application as part of a pipeline-testing contract (see Vista Research, Inc. Pipeline Leak Detection). The Vista Research, Inc. system detects leaks without evacuating the pipelines, so the fuel farm is not shut down for prolonged periods. In order to effectively delineate the plume, SWDIV partnered with Space and Naval Warfare (SPAWAR) Systems Center (formerly known as the Naval Command, Control, and Ocean Surveillance Center Research, Development, Test & Evaluation Division), which developed an in situ petroleum detection system, the Site Characterization and Analysis Penetrometer System (SCAPS), to detect petroleum contaminants in the subsurface using laser-induced fluorescence technology (See SCAPS). SPAWAR Systems Center required a demonstration site; the fuel recovery project fit the required criteria. The

SCAPS rig efficiently delineated the vertical and aerial extent of the plume. No project charges were incurred for the use of SCAPS because the laser-induced fluorescence survey was conducted as part of an ongoing SPAWAR Systems Center research project. The availability and efficiency of the SCAPS saved an estimated $100,000 in project investigative costs.

Because wastewater disposal is costly, a Vacuum Enhanced Product Recovery (VEPR) process was tested to improve fuel recovery rates and reduce water disposal costs. The VEPR process, demonstrated by Metcalf & Eddy, applies a vacuum at the wellhead. This negative pressure enhances the migration of petroleum product into the well, which is then recovered by a subsurface pump. The technology is applied at typical fuel and groundwater recovery wells to improve fuel recovery rates. The pilot test of the VEPR was successful, increasing the fuel recovery rate from 1 and 2 percent to 20 percent by volume. The VEPR is being installed to enhance the remediation efforts at the fuel farm and should be operational by February 1999.

A complication arose during the fuel recovery effort. During routine operation of the free product system, biofouling began to occur in the oil/water separator. It was discovered that 1 percent of the fuel in the subsurface was leaded aviation gasoline (AVGAS) which had led to the biofouling. The lead concentration changed the classification of the recovered fuel from a recyclable product to a Resource Conservation and Recovery Act hazardous waste. This reclassification required that the recovered fuel be disposed of as a hazardous waste.

Because the cleanup effort incorporated many different methods and partners, a video was made to document (1) the innovative technologies used during the recovery process, (2) the time-critical engineering involved in the recovery process design, (3) the commitment to teamwork during the project, (4) the integration of innovative technologies and funding, and (5) the valuable lessons learned for future cleanup projects. Through teamwork and the use of innovative technologies this project achieved three notable results: (1) full environmental regulatory compliance, (2) recovery of over 125,000 gallons of fuel in less than two years of operation, and (3) a quick reduction in free product volume at the fuel farm.

The operation of the system and all subsequent phases of fuel recovery were turned over to the Navy Public Works Center (PWC) in 1997. It is anticipated that the cleanup operation will continue through 2001.

BENEFITS

- Full environmental regulatory compliance is being achieved at the fuel farm
- Over 125,000 gallons of fuel were recovered in two years of operation
- The VEPR system was demonstrated to improve fuel recovery rates and lower water disposal costs
- Cleanup stages were documented in a video, providing information for future cleanup projects

ACCOMPLISHMENTS/CURRENT STATUS

Date	Activity
MAR 1993	Free product discovered at NAS North Island fuel farm
MAR 1994	Pilot study implemented at fuel farm
APR 1994	SPAWAR Systems Center SCAPS utilized in characterization effort
JUL 1994	VEPR system tested at fuel farm during recovery efforts
MAR 1997	Vista Research, Inc.'s Pipeline Leak Detection system used as part of pipeline testing contract
JUL 1997	PWC began operating free product removal system
DEC 1998	VEPR System installation started
FEB 1999	VEPR System operational
OCT 1999	Video placed on Internet
JUN 2001	Video presented at Bioremediation Conference

FUTURE PLAN OF ACTION & MILESTONES

Date	Activity
DEC 2003	Cleanup operation estimated completion

COLLABORATION/TECHNOLOGY TRANSFER

A team of private industry, SWDIV, SPAWAR Systems Center, NELP, private contractors and developers, fuel farm staff, staff civil engineers, and state and local regulators helped to accelerate the Fuel Farm Cleanup. A video was created in order to share lessons learned and encourage use of innovative technologies and methods at similar sites.

BIBLIOGRAPHY

- Metcalf & Eddy Norfleet Video, 1998.

RELATED GOVERNMENT INTERNET SITES

EPA UST SITE

RELATED NAVY GUIDEBOOK REQUIREMENTS

- 07002 Replace UST
- 07003 UST Remedial Investigation
- 07005 UST Remediation

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